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## INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

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<p>(21) International Application Number: PCT/US97/19942</p> <p>(22) International Filing Date: 6 November 1997 (06.11.97)</p> <p>(30) Priority Data: 08/751,388 19 November 1996 (19.11.96) US</p> <p>(71)(72) Applicant and Inventor: ASHER, Randall, S. [US/US]; 9025 E. Mineral Circle, Englewood, CO 80112 (US).</p> <p>(74) Agents: MALKIN, Jay, K. et al.; Klaas, Law, O'Meara &amp; Malkin, P.C., Suite 2225, 1999 Broadway, Denver, CO 80202 (US).</p>		<p>(81) Designated States: AU, CA, JP, KR, MX, European patent (AT, BE, CH, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE).</p> <p>Published <i>With international search report.</i></p>
<p>(54) Title: PLAQUE REMOVING TOOTHBRUSH</p> <p>(57) Abstract</p> <p>A toothbrush (2) capable of removing plaque from teeth wherein a plurality of plaque removing members (22) formed from a mixture of relatively soft elastomeric material and particles of an abrasive material project outwardly from a support portion (6) of the toothbrush and each plaque removing member is surrounded by a plurality of tufts (8) of bristles formed from conventional materials and wherein each plaque removing member has a base portion and a plurality of spaced apart projections (24) with each projection having an outer surface with a plurality of crevices (34) formed therein.</p> <div data-bbox="1026 1556 1616 2027"><p>The diagram illustrates a cross-section of a toothbrush head. A base support portion (6) is shown at the bottom. From this support, several projections (24) extend upwards. Each projection (24) has a base and is surrounded by a tuft (8) of bristles. The projections (24) are spaced apart. The entire assembly is labeled with reference numerals: 6 for the support portion, 22 for the plaque removing members, 24 for the projections, and 8 for the tufts of bristles.</p></div>		

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Plaque Removing ToothbrushField Of The Invention

5 This invention relates generally to toothbrushes for the cleaning of human teeth and relates specifically to a toothbrush for the cleaning of human teeth that is provided with special plaque removing properties.

Background Of The Invention

10 Convention toothbrushes using a plurality of spaced apart tufts of bristles have been used for ages in the cleaning of human teeth. The bristles have been formed from various materials that have been classified from hard to soft. However classified, a bristle remains a bristle. Several  
15 attempts have been made to improve these conventional toothbrushes. United States Patent Nos. 3,103,027 and 3,230,562 disclose toothbrushes having conventional bristles with a plurality of gum massaging tips or wedges interspersed therewith. United States Patent No. 4,571,768 discloses a  
20 toothbrush having conventional bristles and a plurality of resilient projecting elements interspersed therewith. Each projecting element comprises a hollow silicone rubber tube having one closed end with a magnet adjacent to the closed end and a thin synthetic resin piece is inserted into the hollow  
25 tube to improve the strength and resiliency thereof against bending. United States Patent No. 5,040,260 discloses a toothbrush having a plurality of projections each formed from a thermoplastic elastomer. The inner projections are truncated cylinders with the free ends thereof of a beveled  
30 configuration. The outer projections have a conical configuration having a tip as the free end. United States Patent No. 3,985,147 discloses an implement for removing stains and plaque from teeth and has a wheel formed from a hardened rubber, plastic or similar material with an abrasive  
35 material, such as Carborundum particles, pumice or the like embedded therein. As far as applicant is aware of, none of

the above-described patented toothbrushes have been commercially successful.

Brief Description Of The Invention

5        This invention provides a toothbrush for the cleaning of human teeth and removing the plaque therefrom wherein a plaque removing member or members are each surrounded by a plurality of conventional bristles, all of which project outwardly from a support portion of a conventional toothbrush handle.

10        In a preferred embodiment of the invention, a conventional toothbrush handle has a support portion having a plurality of spaced apart tufts of conventional bristles, formed from natural or synthetic materials, secured in and projecting outwardly from the support portion. At least one  
15        plaque removing member, preferably two or more plaque removing members, is secured to and projects outwardly from the support portion. Each plaque removing member is surrounded by a plurality of the spaced apart tufts of conventional bristles. Each plaque removing member is formed from a mixture of an  
20        elastomeric material, such as a silicone rubber, a thermoplastic elastomer or other materials having similar characteristics, and particles of an abrasive material, such as pumice or other materials having similar characteristics. The conventional bristles in the plurality of the spaced apart  
25        tufts preferably extend outwardly from the support portion for a distance greater than the distance that the plaque removal member or members project from the support portion.

30        In a preferred embodiment of the invention, the ratio in the mixture from which the plaque removing member is formed is between about 5.0 and 20.0 parts of the elastomeric material to 1.0 part of the abrasive material by volume. Also, the elastomeric material preferably is a silicone rubber such as that marketed by Macklanburg-Duncan under the trade designation SILICONE 100% Silicone Rubber Sealant and the  
35        abrasive material preferably comprises particles of pumice such as those marketed by Henry Schein under the trade designation flour, fine or medium. The plaque removing member



may be formed by mixing the above-described preferred materials in a blender and then pressed into a mold and allowed to cure. However, since the wear of the plaque removal member or members is minimal, it may only be necessary to embed the abrasive materials into the exposed outer portion of the plaque removing member or members.

Each plaque removing member has a transverse cross-sectional area that is substantially larger than the transverse cross-sectional area of a tuft of the conventional bristles. Also, each plaque removing member preferably comprises a base portion secured to the support portion and a plurality of spaced apart projections extending outwardly from the base portion, which projections are preferably four in number. The outer surface of the combined projections preferably has a central portion recessed inwardly from an outer rim portion. The outer surface of each projection preferably has a plurality of crevices formed therein and some of the crevices may have a connecting portion. The longitudinal length of each projection may vary between about one-quarter of the overall length of the plaque removing member to about three-quarters of the overall length of the plaque removing member.

#### Brief Description Of The Drawings

Illustrative and presently preferred embodiments of the invention are illustrated in the accompanying drawing in which:

Fig. 1 is a top plan view of a toothbrush of this invention;

Fig. 2 is a side elevational view of Fig. 1 with parts removed;

Fig. 3 is an enlarged top plan view of a portion of Fig. 1;

Fig. 4 is an enlarged side elevational view of a plaque removing member of this invention;

Fig. 5 is an enlarged side elevational view with parts removed of a portion of Fig. 1 of one preferred embodiment of

the invention; and

Fig. 6 is an enlarged side elevational view with parts removed of a portion of Fig. 1 of another preferred embodiment of the invention.

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#### Detailed Description Of The Invention

In Figs. 1 and 2, there is disclosed a toothbrush 2 of this invention which has a handle portion 4 and a support portion 6 formed from conventional materials. A plurality of tufts 8 of bristles formed from conventional materials are secured to and project outwardly from the support portion 6 and are in a spaced apart relationship.

At least one and preferably two or more plaque removing members 20 have a base portion 22 which is secured to and projects outwardly from the support portion 6 and are each located to be surrounded by a plurality of the plurality of tufts 8 of bristles. Each plaque removing member 20 has a plurality of spaced apart projections 24 which are integral with and extend outwardly from the base portion 22. A groove 26 separates one projection 24 from another projection 24. Each projection 24 has a longitudinal length in the ratio of about 0.25 and 0.75 of the length of the plaque removing member 20 that extends from the support portion 6. Each projection 24 has an outer surface 28 which, when the four illustrated projections 24 are considered, has a central portion 30 that is recessed inwardly from an outer rim 32. The outer surface of each projection 24 has a plurality of crevices 34, Fig. 3, formed therein.

Each plaque removing member 20 is preferably formed from a mixture of an elastomeric material and an abrasive material. The elastomeric material preferably comprises a silicone rubber or a thermoplastic elastomer such as those described in United States Patent No. 5,040,260. The abrasive material preferably comprises particles of pumice or Carborundum such as those described above in United States Patent No. 3,985,147. The ratio of the elastomeric material and the abrasive material, when the elastomeric material is a silicone

rubber marketed by Macklanburg-Duncan and the abrasive material is pumice marketed by Henry Schein under the trade designation flour, is preferably in the range of between about 5.0 and 20.0 parts of the elastomeric material by volume to 1.0 part of the abrasive material by volume and preferably comprises 10.0 parts of the elastomeric material by volume to 1.0 part of the abrasive material by volume. The foregoing ratios are based on the procedure wherein the elastomeric material and the abrasive material are mixed together so that the particles of the abrasive material are generally evenly spaced apart in the elastomeric material. However, since the plaque removing material is subject to minimal wear, it may be possible to embed fewer quantities of the particles of the abrasive material into the outer surface portions of the plaque removing member that contacts the teeth and gums of the user while retaining the benefit of the mixture.

The toothbrush of this invention is used in a conventional manner. After applying toothpaste, the toothbrush is moved over the teeth while applying pressure thereto. The projections move away from each other and contact a wide surface area of each tooth. Each projection provide a wiping action on each tooth that combines with the abrasive particles to disrupt the plaque on each tooth. Since the projections are spread apart, this provides openings for the removal of the plaque from the cleaning area. The nature of the mixture of the elastomeric material and the particles of the abrasive material in the plaque removing member is such that the particles of the abrasive material have no deleterious effect on the teeth. While the illustrated shape of the plaque removing member is preferred, it is understood that it can be of other configurations.

It is contemplated that the inventive concepts herein described may be variously otherwise embodied and it is intended that the appended claims be construed to include alternative embodiments of the invention except insofar as limited by the prior art.



## What Is Claimed Is:

1. A toothbrush having a plurality of bristles supported on and projecting outwardly from a support portion of a conventional toothbrush handle in a spaced apart relationship which bristles are formed from conventional relatively hard materials comprising:

at least one plaque removing member supported on and projecting outwardly from said support portion;

said at least one plaque removing member surrounded by a plurality of said plurality of bristles;

said at least one plaque removing member being formed from a mixture of relatively soft elastomeric material and particles of an abrasive material.

2. A toothbrush as in claim 1 wherein:

said at least one plaque removing member comprises a plurality of plaque removing members.

3. A toothbrush as in claim 1 wherein:

said plurality of bristles project outwardly from said support portion for a distance greater than the distance said at least one plaque removing member projects from said support portion.

4. A toothbrush as in claim 3 wherein:

said mixture comprises between about 5.0 and 20.0 parts of said elastomeric material by volume to 1.0 part of said particles of an abrasive material by volume.

5. A toothbrush as in claim 3 wherein:

said mixture comprises about 10.0 parts of said elastomeric material by volume to 1.0 part of said particles of an abrasive material by volume.

6. A toothbrush as in claim 5 wherein:

said elastomeric material is a silicone rubber.



7. A toothbrush as in claim 4 wherein:  
said thermoplastic elastomer is a silicone rubber;  
and  
said abrasive material is pumice.

8. A toothbrush as in claim 1 wherein:  
said plurality of bristles comprises a plurality of  
spaced apart tufts of bristles with each tuft having a  
plurality of bristles each formed from a relatively hard  
material.

9. A toothbrush as in claim 8 wherein said at least one  
plaque removing member comprises:  
a base portion secured to said support and  
projecting outwardly from said support; and  
a plurality of spaced apart projections outwardly  
extending outwardly from said base portion.

10. A toothbrush as in claim 9 wherein:  
each of said projections having a transverse cross-  
sectional area substantially greater than the cross-  
sectional area of one of said plurality of bristles.

11. A toothbrush as in claim 9 and further comprising:  
each of said projections having an outer surface;  
and  
said outer surface having a plurality of crevices  
formed therein.

12. A toothbrush as in claim 10 wherein:  
said at least one plaque removing member comprises a  
plurality of plaque removing members.

13. A toothbrush as in claim 12 wherein:  
said plurality of bristles projecting outwardly from  
said support a distance greater than the distance each of  
said plurality of plaque removing members project

outwardly from said support.

14. A toothbrush as in claim 13 and further comprising:  
each of said projection having an outer surface; and  
said outer surface having a plurality of crevices  
formed therein.

15. A toothbrush as in claim 9 wherein:  
said at least one plaque removing member comprises a  
plurality of plaque removing members.

16. A toothbrush as in claim 15 wherein:  
said mixture comprises between about 5.0 and 20.0  
parts of said elastomeric material by volume to 1.0 part  
of said abrasive material by volume.

17. A toothbrush as in claim 15 wherein:  
said mixture comprises about 10.0 parts of said  
elastomeric material by volume to 1.0 part of said  
abrasive material by volume.

18. A toothbrush as in claim 17 wherein:  
said elastomeric material comprises a thermoplastic  
elastomer.

19. A toothbrush as in claim 17 and further comprising:  
each of said projections having an outer surface;  
and  
said outer surface having a plurality of crevices  
formed therein.

20. A toothbrush as in claim 17 wherein:  
said thermoplastic elastomer is a silicone rubber;  
and  
said abrasive material is pumice.

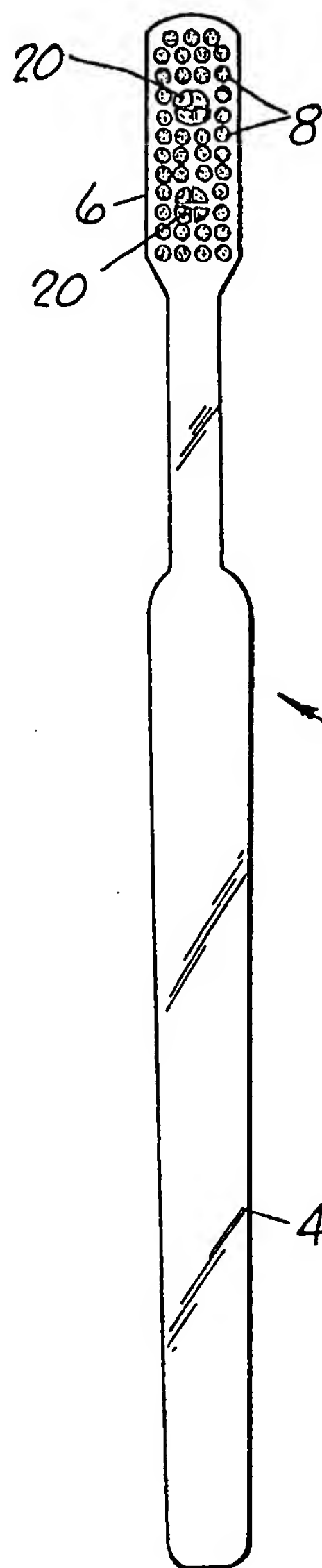


FIG. 1

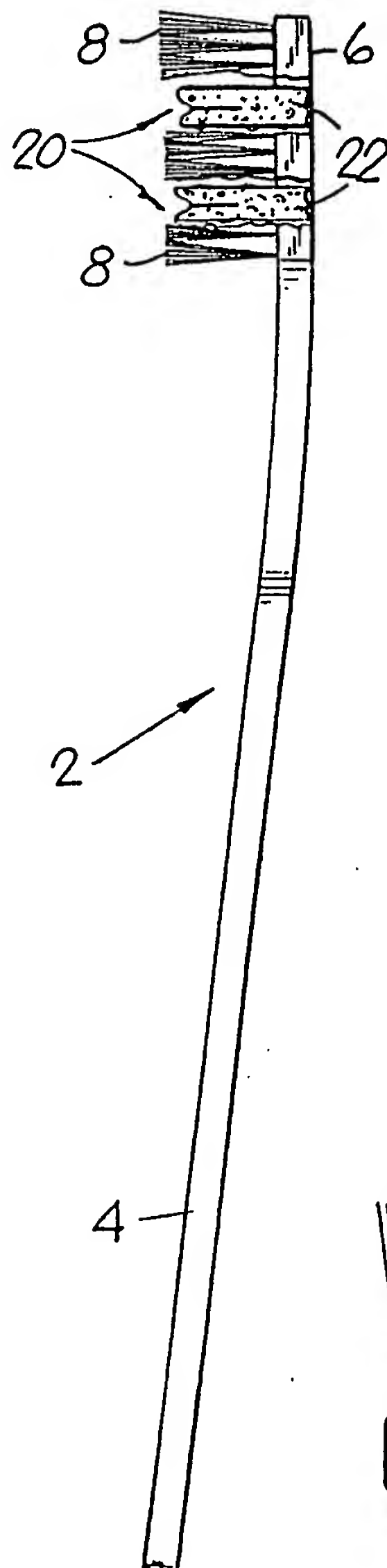


FIG. 2

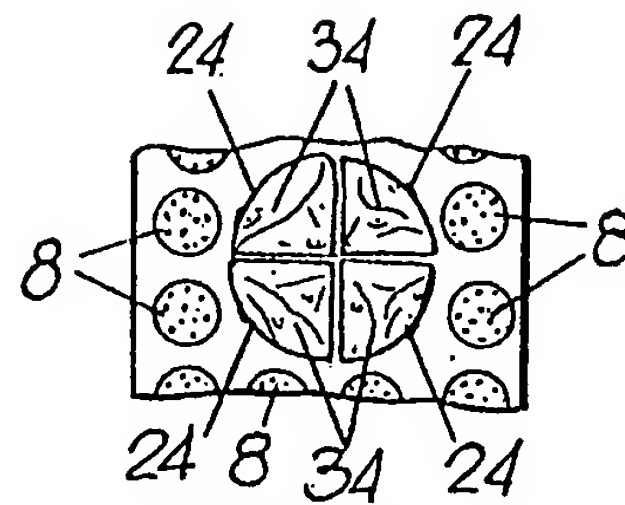


FIG. 3

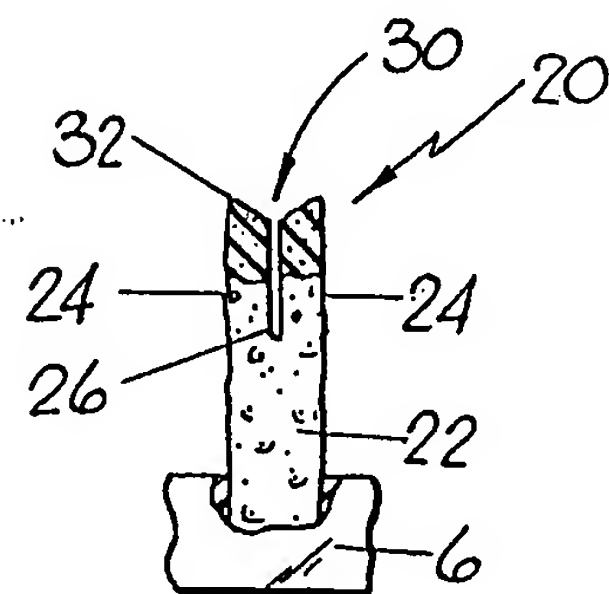


FIG. 4

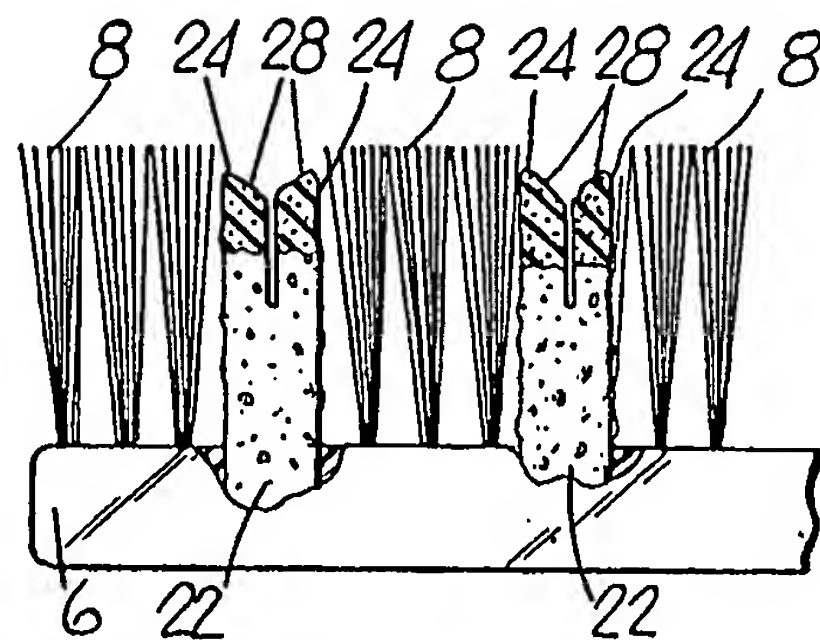


FIG. 5

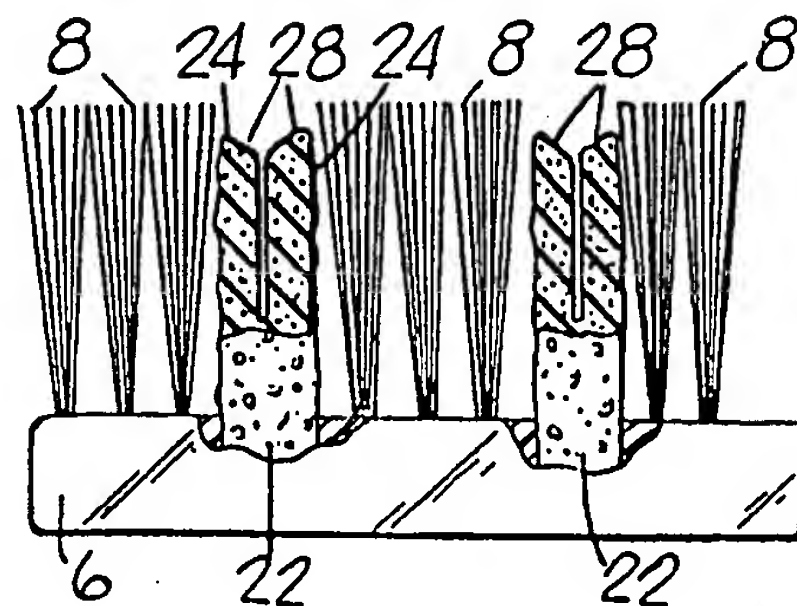


FIG. 6

## INTERNATIONAL SEARCH REPORT

International application No.  
PCT/US97/19942

## A. CLASSIFICATION OF SUBJECT MATTER

IPC(6) :A46B 9/04

US CL :15/ 110, 111, 114, 167.1, 188, 207.2, DIG. 6: 601/141

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

U.S. : 15/ 110, 111, 114, 167.1, 188, 207.2, DIG. 6: 601/141

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched  
NONEElectronic data base consulted during the international search (name of data base and, where practicable, search terms used)  
NONE

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 1,128,139 A (HOFFMAN) 09 FEBRUARY 1915, SEE ENTIRE DOCUMENT.	1-20
A	US 2,702,914 A (KITTLE ET AL.) 01 MARCH 1955, SEE ENTIRE DOCUMENT.	1-20
A	US 4,288,883 A (DOLINSKY) 15 SEPTEMBER 1981, SEE ENTIRE DOCUMENT.	1-20
A,P	US 5,604,951 A (SHIPP) 25 FEBRUARY 1997, SEE ENTIRE DOCUMENT.	1-20
A,P	US 5,678,275 A (DERFNER) 21 OCTOBER 1997, SEE ENTIRE DOCUMENT.	1-20

☐ Further documents are listed in the continuation of Box C.☐ See patent family annex.

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